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ABSTRACT

A description is given of the process of setting nationwide objectives in disease prevention and health promotion. Five national public health goals for enhancing the health of the population at five major life stages are discussed: (1) infant health and mortality reduction; (2) child health and development; (3) health and health habits of adolescents and young adults; (4) improving adult health; and (5) improving health and quality of life for older adults. Priority items are identified within the categories of preventive health services, health protection, and health promotion. The development of these health objectives was undertaken in response to three perceived needs: (1) clarification of national opportunities and intentions; (2) establishment of benchmarks to which federal programs could be addressed; and (3) establishment of a process, national in character, but adaptable to facilitiating the development of local programs. This effort is discussed in the context of the procedural rationale, international experience, and some specific applications. (JD)

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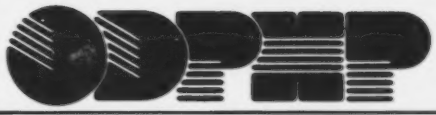

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Introduction

Of the broad range of governmental responsibilities in public health, perhaps none is more fundamental than the obligation to provide perspective and direction to guide health programs along a productive course—the agenda-setting function. For governments with a strong central planning focus, setting the agenda determines the distribution of national resources. For others, its importance stems at least as much from the ability of nationally identified goals to motivate and recruit the commitment of local and private resources.

Recently in the United States, effort has been directed toward the establishment of measurable national goals in disease prevention and health promotion. The process is described in this chapter as a case study on the experience of setting nationwide objectives in disease prevention and health promotion.

Periodic reviews of the charge to the U.S. public health community date back to the work in New England of the Reverend Edward Wigglesworth in 1789, who provided the first American mortality tables, and the 1850 *Report of a General Plan for the Promotion of Public and Personal Health*, presented to the Massachusetts Legislature by Lemuel Shattuck (Williams, 1976).

The most recent, and most comprehensive, review was initiated in 1979 with the publication of *Healthy People*, the first Surgeon General's report on health promotion and disease prevention (DHHS, 1979). In the report the following five national public health goals were announced for enhancing the health of the U.S. population at the five major life stages:

1. To continue to improve infant health, and, by 1990, to reduce infant mortality by at least 35 percent, to fewer than nine deaths per 1,000 live births.

2. To improve child health, foster optimal childhood development, and, by 1990, to reduce deaths among children aged 1 to 14 years by at least 20 percent, to fewer than 34 per 100,000.

3. To improve the health and health habits of adolescents and young adults, and, by 1990, to reduce deaths among people aged 15 to 24 years by at least 20 percent, to fewer than 93 per 100,000.

4. To improve the health of adults, and, by 1990, to reduce deaths among people aged 15 to 64 years by at least 25 percent, to fewer than 400 per 100,000.

5. To improve the health and quality of life for older adults and, by 1990, to reduce the average annual number of days of restricted activity due to acute and chronic conditions by 20 percent, to fewer than 30 days per year for people aged 65 years and older.

These goals were based on an assessment of the recent historical trends combined with an estimate of the extent to which concerted and strategic intervention might accelerate potential gains. Special emphasis was given to two problems, expressed as subgoals, for each life stage. For infants, particular attention was given to the problems of low-weight births and birth defects; for children, factors in childhood growth and development as well as childhood accidents and injuries; for adolescents and young adults, fatal motor vehicles accidents and misuse of alcohol and drugs; for adults, heart attacks, strokes, and cancers; and for the elderly, increasing functional independence and reducing premature death from influenza and pneumonia.

Fifteen priority areas were also identified as the objects of intervention programs necessary for achieving overall health status goals. These activities were grouped as below into three categories—preventive health services, health protection, and health promotion—as a structure for planning national health strategies:

(a) *Preventive Health Services*
- High blood pressure control
- Family planning
- Pregnancy and infant care
- Immunizations
- Sexually transmitted diseases services

(b) *Health Protection*
- Toxic agent control
- Occupational safety and health
- Accidental injury control
- Fluoridation of community water supplies
- Infectious agent control

(c) *Health Promotion*
- Smoking cessation
- Reducing misuse of alcohol and drugs
- Improved nutrition
- Exercise and fitness
- Stress control

Following the identification of these priority areas, broad specific and measurable decade-long objectives were developed for each of the 15 areas (DHHS, 1980a). The strategy was presented in the form of 226 objectives, with measurable end-points targeted to 1990. The development of these health objectives was undertaken in response to three perceived needs: (a) to clarify national opportunities and intentions; (b) to establish benchmarks to which federal programs could be addressed, and by which they could be assessed; and (c) to establish a process which, while national in character, could be adapted to facilitate the development of local programs. The result was a reasonably straightforward application of the management by objectives concept to the public health arena. This effort is discussed in the context of the procedural rationale, international experience, and some specific applications.

Managing by Objectives

Though the term "management by objectives" was introduced only in the last generation (Drucker, 1954), the concept has been emerging for some time. The notion refers to a set of procedures directed to identifying the individual steps and targets necessary to achieve common goals. The underlying assumption is that it is possible to specify common goals that, when explicitly identified, will yield efforts which are more focused, efficient, and consonant with the prevailing consensus about desired outcomes. A related assumption is that people closest to a particular problem or issue have an advantage in identifying management opportunities, given certain broad parameters. This concept has been applied widely to a number of management enterprises, public and private, in which the intent is to reach some usually quantifiable or measurable goal (Odiorne, 1972).

Management by objectives has been a sporadic feature of governmental decision making and implementation since the 1930s, but the private sector has generally been recognized as its most vigorous proponent. More recently, however, as the complexity of governmental activities has grown, management by objectives has appeared with increasing frequency in the public lexicon.

The benefits from this approach are derived both in terms of the objectives and of management. Applying the concept of management by objectives results in a number of revelations about the objectives themselves. First, it makes clear whether an agency actually has objectives or merely good intentions. Setting an objective establishes the framework for its attainment. Hence a program objective must lead naturally to the component tasks and the assignment of those tasks.

Second, its application reveals that equally valid objectives may be mutually inconsistent or even incompatible and that often risky efforts at balancing and tradeoffs are required in decision-making. Priorities must be set, and these will involve postponing some actions in favor of others. Furthermore, even within the context of a single goal, a choice will have to be made among various strategies. Third, the systematic appraisal of services and activities will identify candidates for abandonment—programs that are obsolete or nonproductive. Fourth, the management by objectives process will help clarify whether or not the objectives are realistic in terms of specific targets, timetables, strategies, and resource allocation. In other words, whether or not a plan can be implemented. Finally, it will establish a measurement standard. Without objective means of assessing outcomes, a program cannot have easily discernible accomplishments, only expenditures of resources. Defining measurements makes it possible to organize the feedback from results and to systematically review and revise objectives, roles, priorities, and allocation of resources (Drucker, 1981).

A number of features of public sector activities make management by objectives especially applicable to government. The sheer size of government makes it more likely that organizational motives and goals will be diffused by the complexity of the tasks and functions. For example, the personnel branch, the grants and contracts branch, the public affairs branch, and the various program branches of a government agency may each be motivated by different forces which relate in very different ways to an organization's overall mission. This complexity has inherent within it the potential for conflicting objectives. A focus of the personnel branch on employee privileges may run directly counter to the interest of a program manager who wishes to streamline certain employee functions. Or the needs of a program manager may conflict with the procedures of a contracts branch charged with safeguarding against system abuses. Furthermore, in public sector activities much of the energy and discussion within an organization may be focused on issues which in fact bear little relation to actual performance relative to the organization's mission. Budgetary allocations offer an example of this phenomenon. In government, because the intend-

ed inputs and outputs are not things but people and identifiable social improvement in some discrete sphere, the direction programs ought to take may not be inherent in the activities. Indeed rules, regulations and smooth functioning can be mistaken for real accomplishment (Drucker, 1981).

The complexities are readily apparent in the health arena. The overall aim of health policy is of course to improve health. But an elaboration on the focus and means for improving health reveals some of the tensions and uncertainties. Does this mean building more sanitation facilities? Does it mean better inspection to ensure a safe food supply? Does it mean supporting research to improve the knowledge base upon which action can be taken? Perhaps it means a prohibition of smoking or the growing of tobacco. Should the focus be on physicians—training them, licensing them and reimbursing them? Or should it be on other people, the clients of physicians—ensuring the delivery of basic health services? If so, to all the people or only certain vulnerable subsets? And, which ones? What is the proper mix of activities? What are the priorities? What ought to be reasonably achievable, given resources and constraints?

The full set of issues contains multiple strategies which are often conflicting and it may be impossible to address them all simultaneously. These are the sorts of issues which management by objectives ought to be helpful in resolving. Because its central utility is in reducing broad aspirations to concrete program actions, it is much more than a way to implement decisions. It is the process by which those decisions are made. Assuming that objectives stated in measurable terms are actually measures of performance—not just efforts—the process of arriving at each objective is, in effect, a policy decision.

Some general prerequisites pertain to the successful application of the process of setting objectives, whether in a commercial or a social context. They include the ability to define a problem clearly, the existence of a discrete constituency, the availability of an effective intervention methodology, the social acceptability of that methodology, and a means to track the progress. Assuming these prerequisites, several types of objectives can be developed and applied to a management process: outcome objectives, strategy objectives, marketing objectives, productivity objectives, and innovation objectives. In fact, stating the outcome objectives (for example, profits) may be superfluous, for desirable outcomes should be viewed as requirements, not as objectives for the process. Table 1 compares the application of the various objective classes to a business and a health context. In these examples, the final outcome sought for the business sector is profits and for the health sector it is reduced morbidity and mortality.

Table 1
Application of the Management by Objectives Concept

Objective classes	Business applications	Health application
Outcome	Profits	Morbidity and mortality reduction
Strategy	Product type and mix	Risk factors
Productivity	Labor/capital mix	Scope of services
Marketing	Client attitudes and awareness	Public/professional attitudes and awareness
Innovation	Product improvement	Surveillance, evaluation, and research

Because these are the requirements or goals of the enterprise, they need not be explicitly stated, except perhaps as broader goals or predictions. For the purpose of tailoring organizational activities to achieve the component goals, the most important objectives are those directed to program processes which will yield the intended outcome—that is, those related to strategy, marketing, productivity, and innovation.

A strategy objective in the business setting might be the charge set for a particular product. In the health setting, it might be which risk factors to try to affect. In seeking to reduce heart disease, for example, what changes might be reasonably sought with respect to smoking, high blood pressure, or blood cholesterol levels? A marketing objective in the business setting might refer to the changes sought in client attitudes and awareness, hence how much effort to devote to advertising and which audiences to target for certain behavior change. In health, marketing objectives might be tailored to changing the level of awareness of certain population groups, for example, the awareness of pregnant women about special controllable hazards to the fetus, or of teenagers about risks of alcohol or drug misuse, or even the awareness of primary care physicians about the preventable problems over which they might have some influence.

Productivity objectives in the business setting relate to the targeting of certain levels of product output for a given labor, capital, or technical input. And in the health care setting these kinds of objectives relate to the number of people reached with certain services, or to the scope and intensity of health protection efforts for various population groups. Innovative objectives for business include the extent to which they invest in laboratories and quality control. For health, the innovation objectives relate both to efforts to monitor progress with surveillance systems and to efforts aimed at developing new intervention methodologies through research.

Although the most widely recognized proponents of management by objectives have come from the corporate world, the applications to health are expanding rapidly. Examples include the efforts undertaken to gauge the productivity of health care institutions in terms of bed utilization rates, laboratory capacity or patient visits per unit of time. Some efforts have been more explicitly relevant to health gains. The WHO's smallpox eradication program, especially in its later phases, provides perhaps the best example of an effort deploying locally derived objectives on both process and outcome to assist in the global elimination of the disease. The U.S. National Childhood Immunization Initiative, implemented between 1977 and 1979 by the Department of Health and Human Services, provides a good example of successful application of the concept on a national basis. Both will be discussed more fully below, as will other examples indicating that the management by objectives process can work not only with major perceived threats, but also with routine public health programs.

International Context

Establishing targets in public health as a national effort has been undertaken by many countries, particularly in recent years. Especially as research has unveiled more opportunities, population growth and industrialization have created more problems, and the exigencies of economic pressures have offered more constraints, many leaders have felt the need to clarify national directions in health. An additional force compelling such exercises has been the realization that efforts to improve health must be linked to other efforts aimed at improving social and economic conditions, the complexity of the task requiring careful integration and planning.

Several such efforts have been undertaken recently. In 1971, the Federal Republic of Germany issued a planning document which noted the importance of linking health policy with economic policy, cultural attitudes, and political values. Special emphasis in the document was given to prevention, health maintenance, and care of the sick and handicapped. The Soviet Five-

Year Plan for Public Health 1971-75 also took a broad view, calling for a general improvement in mental and physical health and a lowering of the prominent sources of morbidity and mortality. Problems emphasized were infectious diseases, and those of children and the elderly. Tools to be particularly employed were sanitary measures and epidemiological analysis. In 1972 the 10-Year Plan for the Americas (1971-80) was issued by the Pan American Health Organization (PAHO). That plan noted the importance of health generally to national development, and offered goals on health services, maternal and child health, and infectious diseases, with special attention to the emerging chronic diseases. Among the quantified targets was a two-year increase in life expectancy over the decade for those countries with personal life expectancies in the range 65 to 69 years. In 1973, the Swedish National Board of Health and Welfare issued a planning document addressing the future organization of health, emphasizing service integration and long-term care, and offering a plan for the establishment of local health centers. It also proposed a three-cycle planning process focusing on 5-, 15- and 30-year plans. In 1974, the Mexican Health Plan was issued which included 10-year goals in health to be integrated with other aspects of overall national development, and calling for emphases including health education, nutrition, sanitation, worker's health, maternal and child health, and infectious diseases. Also in 1974, the Minister of National Health and Welfare in Canada issued *A New Perspective on the Health of Canadians* which called for a five-pronged health strategy with renewed emphasis on health promotion, regulatory protection, research, efficiency of health care services, and goal setting. In 1976, England's Department of Health and Social Services released a document on priorities for health and personal social services which emphasized care and preventive services. A special focus was placed on vulnerable populations—the elderly, children, the handicapped, and the mentally ill. Table 2 displays some of the areas of special interest to 45 nations whose activities of the last 15 years have been reviewed (DHEW, 1977).

There is wide variety in both the structure and the focus of these goal-setting efforts. This reflects the fact that each of the countries sponsoring the work has different needs and different uses to which the goal-setting process might be put. While the major problems in certain countries relate to infectious diseases, those in others may be driven by industrial pollution or life-style factors. Whereas some countries need only general indicators of national problems and priorities, others need specific direction on the allocation of national budgets. Accordingly, the goal statements reflect the disparate uses to which they will be put. For some countries they are couched more as national hopes and aspirations than attainable goals. For others they reflect more the utility of the process in consensus building than

Table 2
National Health Goals*

Goal Statements by goal dimensions	Numbers of countries incorporating goal statement							
	Total (n = 48)	West Europe (n = 8)	East Europe (n = 4)	Western Hemp. (n = 12)	Medit. (n = 5)	Africa (n = 11)	SE Asia (n = 4)	West Pac. (n = 3)
Health Status								
Reduce communicable disease	23	2	1	12	1	5	2	-
Reduce infant mortality	14	1	2	8	-	2	1	-
Reduce mental illness	8	2	-	5	1	-	-	-
Reduce accidental deaths	7	1	-	5	-	-	-	1
Health Promotion								
Improve sanitation and environmental conditions	20	-	1	10	3	3	3	-
Extend health consciousness	20	5	1	6	3	3	2	-
Improve access to safe drinking water	11	-	-	6	2	1	1	1

(table continued)

Table 2 *(continued)*
National Health Goals*

Goal Statements by goal dimensions	Numbers of countries incorporating goal statement							
	Total (n=48)	West Europe (n=8)	East Europe (n=4)	Western Hemp. (n=12)	Medit. (n=5)	Africa (n=11)	SE Asia (n=4)	West Pac. (n=3)
Improve availability of adequate diet	8	1	1	4	1	-	1	-
Reduce environmental pollution	7	1	1	4	-	-	-	1
Health Services								
Increase access in rural and urban areas	25	2	4	9	2	5	2	1
Increase number of providers	18	3	1	-	1	8	3	2
Increase number of facilities	23	5	1	4	5	4	3	1
Improve maternal and child health services	20	2	1	6	4	3	3	1
Increase in-service training	13	3	-	4	3	2	1	-

(table continued)

Table 2 *(continued)*
National Health Goals*

Goal Statements by goal dimensions	Numbers of countries incorporating goal statement							
	Total (n = 48)	West Europe (n = 8)	East Europe (n = 4)	Western Hemp. (n = 12)	Medit. (n = 5)	Africa (n = 11)	SE Asia (n = 4)	West Pac. (n = 3)
Develop comprehensive services	12	3	2	2	1	2	1	1
Improve health care for mentally, physically handicapped	6	4	-	1	-	-	-	1
Improve services to elderly	5	5	-	-	-	-	-	-
Improve management	8	-	-	5	-	-	-	-
Innovation								
Increase research efforts	6	-	1	2	1	1	-	1
Data								
Improve data systems	11	1	-	7	2	1	-	-

**20 goals most frequently found in national health plans, by goal dimensions and numbers of countries incorporating such statements, world-wide and by geographical regions.*
Source: DHEW (1977)

in predicting an achievable end-point. In other cases, stated goals may be tailored by perceptions of what potential institutional or international grant-giving bodies might want to see. Only rarely is the principal motivation for such activities related directly to program management.

United States Model

The Context

A more detailed examination of the recent U.S. experience in objective setting may be instructive with respect to both the prospects and the problems of the process. First a review of the context: In the United States, a number of factors have converged to foster the development and implementation of an agenda-setting process. Possibly the most significant of these was the development of a fuller understanding of the factors which affect health status and a sense of confidence with respect to our ability to control those factors.

The health of Americans has improved steadily even without a system to identify health objectives explicitly. For example, the provisional age-adjusted death rate for all Americans in 1980 was only about one-third the rate in 1900 (Table 3). Most of the improvement in health status is assigned to gains against infectious diseases, but the precise nature of factors contributing to this gain remains debatable. Indeed, given the progress that apparently occurred well before widespread application of any of the major interventions of vaccination and antibiotics, a good case has been made for the contribution of fundamental improvements in socioeconomic status with concomitant improvements in nutrition and sanitary conditions (McKeown, 1976).

Perhaps most remarkable have been gains in the survival of infants and children. Indeed, as Table 4 shows, by 1980, the provisional death rate for infants had dropped to less than one-tenth of the level at the turn of the century, and for children up to age 15 years, to one-twentieth of the level in 1900.

During the decade 1970-80, life expectancy at birth increased by some 2.8 years, an increase greater than that for the previous two decades combined (Table 5). Overall life expectancy at birth has increased by 24 years since 1900 (from 49.2 years in 1900 to 73.6 years in 1980). During the same period, however, the life expectancy gain for a 45-year-old American was only 7.3 years (from 24.8 years in 1900 to 32.1 years in 1980).

Table 3
Age-Adjusted Death Rates per 100,000 Population for Leading Causes of Death, 1900 and 1980

1900			1980[a]		
Cause	Rate	Percent of total[b]	Cause	Rate	Percent of total[b]
Influenza and pneumonia	210	12	Heart disease	205.3	34.6
Tuberculosis	199	11	Cancer	134.2	22.6
Heart disease	167	9	Stroke	41.5	7.0
Stroke	134	8	Accidents	43.4	7.3
Diarrhea and related diseases	113	6	Influenza and pneumonia	12.6	2.1
Cancer	81	5	Cirrhosis/ chronic liver disease	12.6	2.1
Accidents	76	4	Suicide	12.2	2.1
Diabetes	13	2	Diabetes	10.1	1.9
Suicide	11	1	Homicide	11.4	1.9
Homicide	1	1	Tuberculosis	0.5	0.1
All other causes	775	44	Diarrhea	0.7[c]	0.1[c]
			All other causes	109.6	18.4
All causes	1,779	100	All causes	594.1	100.0

Sources: Annual Summary of Births, Deaths, Marriages, and Divorces: United States, 1930, Monthly Vital Statistics Report, Vol. 29, No. 13, 17 Sept. 1961; and unpublished data. National Center for Health Statistics.

[a]*Provisional data.*

[b]*Percentages do not add to 100.0 because of rounding.*

[c]*Figure is for 1978. Not available for 1980.*

Impressive health gains for the adult population, however, have been realized in recent years, at least as measured by mortality figures. The expected additional years of life for a 45-year-old person have amounted to about 2.0 years during the last decade, a striking 6.6 percent increase. This gain for adults—substantially attributable to declines in the death rates from heart attacks and strokes of 25 percent and 40 percent, respectively—is proportionately greater than the 4.0 percent increase in life expectancy at birth for the same period (McGinnis, 1982).

Many factors are involved in these gains in ways not yet fully understood. Certainly the growth in the knowledge base has provided considerable impetus. As noted in Table 6, the improvement in our understanding of the factors involved in various diseases has been impressive.

But with the development of our enhanced understanding, as well as the improvements in health status, a number of issues have been raised related to the U.S. public health agenda. Although the recent trends cited certainly offer cause for encouragement, questions must be answered about the extent to which health gains have occurred "at the margin"—that is, among the persons most easy to reach or to convert to a more healthy life-style rather than among the highest cost users of health care. Could more carefully targeted and monitored efforts help facilitate gains for the most vulnerable groups?

The Model

Against the backdrop of health gains, reinforced by the prospects of even greater gains, an interest has developed in the clarification of national goals and objectives in health. Consequently, out of efforts to analyze the risk factors from the leading causes of morbidity and mortality in the United States has grown the development of the 1979 *Surgeon General's Report on Health Promotion and Disease Prevention* and the 1980 report which identified the health objectives for the decade. The conceptual underpinning for those efforts is noted in Figure 1, which portrays the various factors which go into determining the health status profile of a particular population group (McGinnis, 1983). Health status is determined by a variety of biological, behavioral, environmental, and social risk factors. Biological risk factors are those individual physiological and structural features—often genetically endowed—which determine special propensities, susceptibilities, or immunities in various circumstances. Behavioral risk factors are those specific behaviors that may put an individual at increased or decreased risk, and which may be engaged in with some knowledge of potential consequences.

Table 4
Mortality Rates by Age Group

Age group	Deaths per 100,000 population	
	1900	1980*
Infants	16,244.8	1,310.7
Children (ages 1-14)	866.3	40.7
Adolescents and young adults (ages 15-24)	585.5	118.8
Adults (ages 25-64)	1,270.2	506.9
Older adults (ages 65 and over)	8,225.8	5,290.8

**Provisional data*
Source: National Center for Health Statistics.

Table 5
Changes in Life Expectancy in the United States

Year*	Life expectancy at birth in years	Percentage gain in decade	Life expectancy at age 45 in years	Percentage gain in decade
1900	49.2	-	24.8	-
1910	51.5	4.7	24.5	-1.2
1920	56.4	9.5	26.3	7.3
1930	59.2	5.0	25.8	-1.9
1940	63.6	7.4	26.9	4.3
1950	68.1	7.1	28.5	5.9
1960	69.9	2.6	29.5	3.5
1970	70.8	1.3	30.1	2.0
1980+	73.6	4.0	32.1	6.6

**Except for 1980, the numbers given are based on data for three-year periods. For example: figures for 1970 are based on data for 1969-71.*
+ Provisional data.
Source: National Center for Health Statistics.

Table 6
Risk Factors for Leading Causes of Years of Potential Life Lost (ages 1-74)

Case	Risk factors
Heart disease	Smoking, high blood pressure, elevated serum cholesterol, diabetes, obesity, lack of exercise, coronary-prone behavior
Cancers	Smoking, alcohol, diet, sexual behavior, solar radiation, ionizing radiation, worksite hazards, environmental contaminants, certain medications, infectious agents
Motor vehicle accidents	Alcohol, no safety restraints, speed, automobile design, roadway design
All other accidents	Alcohol, smoking (fires), product design, home hazards, handgun availability
Suicide	Handgun availability, alcohol and drug misuse, stress
Homicide	Handgun availability, alcohol, stress
Stroke	High blood pressure
Cirrhosis of liver	Alcohol
Influenza/pneumonia	Vaccination status, smoking
Diabetes	Obesity (for adult-onset disease)

Environmental risk factors are those potentially hazardous agents or factors in the environment, both manmade or natural, which affect the risk for disease or disability. Social risk factors include a host of exogenous influences over which an individual may have only marginal control, such as, economic status, educational level, geographical isolation, access to health services, and nature of the food supply.

These risk factors can in turn be influenced by the presence or absence of various programs. The types of service programs will include general health services, that is, those medical and surgical interventions offered by health providers to remedy a biological or behavioral condition endangering health status. But they also include health promotion programs which include educational and motivational services to enhance health behavior, as well as health protection efforts which evoke statutory and regulatory

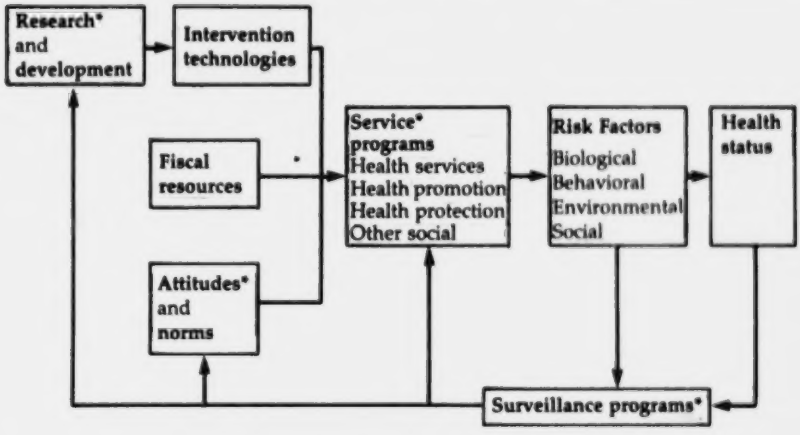
measures to facilitate the health of a population group. Other relevant social programs that may influence health status range from income supports and unemployment benefits to meals for the aged, day care, and farm policies.

The availability of services is determined by the existence of appropriate intervention technologies, hospitable fiscal conditions, and receptive attitudes and norms. An effective research and development capability is necessary to the production of innovative intervention technologies. Surveillance programs provide information about health status and risk factor prevalence which can be used to shape the character of services, public and professional attitudes and norms, and research and development efforts.

The Process

In the U.S. experience, management by objectives has been applied to enhance the work of a national health agency seeking to influence various pressure points in this scheme in such a way that progress can be directed and facilitated. The Department of Health and Human Services identified a number of loci as appropriate targets for setting objectives—the service programs, attitudes and norms, surveillance programs, and research and demonstration projects. In 1979 and 1980 attention was focused on the

Figure 1. Factors Determining Health Status



*Focus for management by objectives effort.

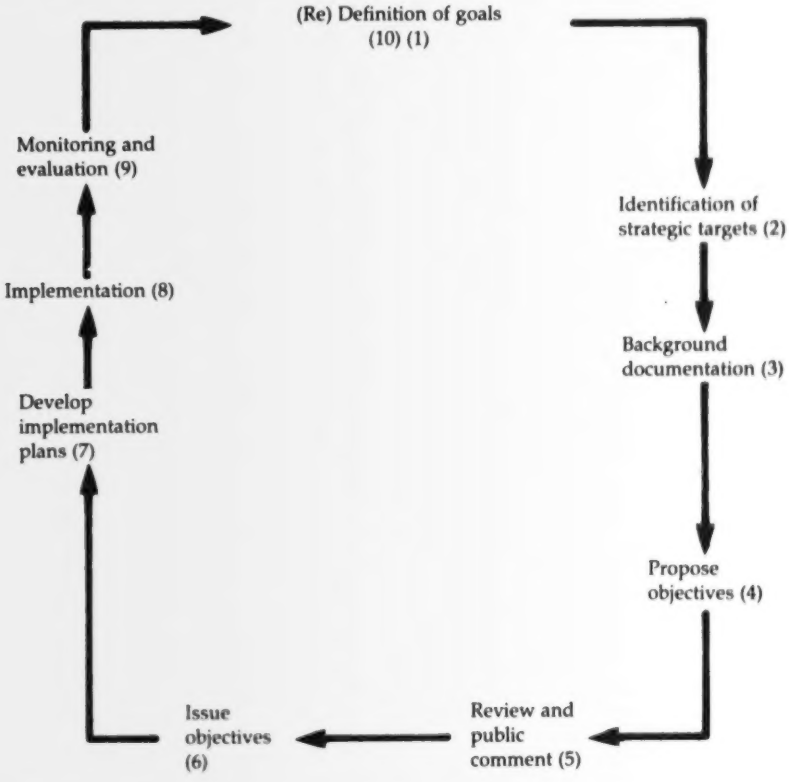
development of objectives in these areas. Objectives were also stated for improved health status and reduced risk factors—both outcome measures—but were included more as an indication of where the United States might reasonably be expected to emerge, in terms of national health status, if the stated process objectives were attained.

The process of developing the objectives themselves had several stages. This together with the process of implementation and review is illustrated in Figure 2. The process was initiated with the decision to set quantified health status goals in *Healthy People*, as noted above in the introduction (DHHS, 1979). The general strategy targets were simultaneously identified by assessing the risk factors involved in the leading sources of morbidity and mortality for each age group, and determining those for which the health-care system might reasonably accept responsibility. It was then decided that a broad-ranged public and private effort would be the best vehicle for establishing a national consensus on quantifiable objectives within each of the strategy categories. Motivating the collective approach was the knowledge that developing and implementing a national strategy for prevention, not merely a federal one, required the co-operation of many public service organizations from federal, state, and local governments, and from the private sector.

To initiate the formulation of the objectives, a governmental planning group was assembled and agencies within the U.S. Public Health Service were assigned responsibility for developing background documentation, which reviewed the major challenges in each of the 15 areas, noted the program opportunities, and postulated a number of feasible objectives for the respective areas. These papers were then provided to the participants in a 1979 conference which brought together 167 invited experts from outside the government who were organized into 15 working groups and charged with developing the first public drafts of objectives for the 15 areas. Participants were selected for their insight into some aspect of risk reduction in a particular area and represented a variety of institutional perspectives, including providers, academic centers, state and local health agencies, and voluntary health associations (DHHS, 1980a). In addition to the invited experts, approximately 50 representatives of interested federal agencies attended the various working group sessions as observers.

The priorities for each category were generally arrived at through a consensus process, drawing baseline and background information both from the individual expertise of the participating authorities, and the papers which had been prepared for the use of the conferees. The process involved first

Figure 2. Setting Objectives: A Process Schematic



identifying the most serious problems in each of the respective areas, giving attention not only to aggregate national data, but also to what was known about high risk groups, then matching up those problems with what the knowledge base offered as the most viable opportunities for intervention against those problems. The last step in the process required assessing the various objectives which had been developed, for balance between the objective categories—was there an imbalance between risk factor objectives versus awareness objectives versus services objectives? If so, was it justifiable, or was something being overlooked?

In some cases there was a temptation in the working groups to let the ease

of establishing a specific number drive the priority. That is to say, if a well-known data set related to a particular area was available, and if there was some confidence that those data would also be available in 1990, and if the relevant program activity seemed to be relatively easily implemented, there was a temptation to identify automatically that activity as a priority objective category. Though pragmatism compelled a certain tolerance for this inclination, working groups were generally urged to search carefully for opportunities for legitimate, sustained and meaningful change, rather than yield to the course of least resistance.

The development of the numbers themselves for each of the objectives varied with the particular objective. Some were linear extrapolations of the current trends, as was the case, for example, with the infant mortality objective. In other cases, particularly in those like polio incidence where progress had already been substantial and similar gains could not be expected, the projected number represented maintenance of the status quo. But some objectives targeted a quantum improvement in the situation, for example, the objective that the proportion of women in any county, or racial, or ethnic group, who obtained no prenatal care during the first trimester of pregnancy should not exceed 10 percent (versus the 40 to 45 percent currently prevalent for some ethnic groups).

In each of the work group discussions on quantification there was a lively exchange over the merits of establishing as the target a figure which would represent: (a) a societal tolerance level for a particular condition (in which case politics would demand that the number be set very low), or (b) a figure representing what society ought practically to be able to achieve within the requisite period of time, given reasonably likely resources. But the element of quantification was placed as paramount. For every objective category, except the surveillance and evaluation objectives, working groups were urged to establish a specific objective which was quantifiable and which could theoretically be tracked. Broad non-numerical statements of good intentions were not considered acceptable.

Finally, each working group was asked to identify the principal assumption on which its projection was based. What resources were anticipated for accomplishing the goal? Was any change foreseen in the technology available or in societal attitudes and norms?

The papers developed out of the working group efforts were then edited within the Department of Health and Human Services to format as uniformly as possible, their availability was published in the *Federal Register*, and

they were circulated to more than 2,000 groups and individuals nationally for review and comment. Revisions were made based on the comments received, circulated within the government for a final review, and issued in 1980.

The Objectives

A few items deserve special emphasis. First, although the objectives were printed by the U.S. Government and subjected to the review process normally required of positions developed by the U.S. Government, they did not necessarily reflect a federal perspective. The objectives themselves were intended to be national, not federal. In effect they are national guidelines to be used as reference points for the broad range of national organizations and institutions responsible for actually achieving the health gains which are possible in the United States. Secondly, they reflect arbitration and consensus, and as a result represent a curious melange of values and perspectives. Hence some are imperfect statements of the actual potential involved. On the other hand, an effort was made to minimize such problems through the provision of some general guidelines. Specifically, participants were directed to confine the objectives developed to what might feasibly be attained during the decade of the 1980s, assuming neither major breakthroughs in prevention technology nor large infusions of new federal monies. The interest was in focusing on the possible. A good example of this perspective is offered by the goal for infant health which is to reduce the infant mortality rate to no more than nine deaths per 1,000 live births in 1990. Because several areas in western Europe and certain locales within the States have already achieved rates of five deaths per 1,000 live births, theoretically the United States should be able to do much better than this. Yet, because there exist substantial disparities between the risks experienced by some population groups within the United States, it was judged prudent to set a realistic target (DHHS, 1980a).

The distribution of the objectives by area is noted in Table 7. The range is from nine objectives for high blood pressure to 20 objectives each for toxic agent control and occupational safety and health. Within each area, the objectives are grouped into five categories: improved health status; reduced risk factors; improved public and professional awareness; improved services and protection; and improved surveillance and evaluation. Table 8 indicates the number of objectives grouped into each of these categories. The objectives on improved health status and reduced risk represent statements of anticipation and intent, rather than management enterprises. While they are important indicators of overall national policy, they do not

Table 7
Number of Objectives by Area

Preventive services	
High blood pressure control	9+
Family planning	10
Pregnancy and infant health	19*
Immunization	18*
Sexually transmitted diseases	11
Health protection	
Toxic agent control	20
Occupational safety and health	20
Accident prevention and injury control	17
Fluoridation and dental health	12
Surveillance and control of infectious diseases	12*
Health promotion	
Smoking and health	17
Misuse of alcohol and drugs	19*
Nutrition	17+
Physical fitness and exercise	11
Control of stress and violent behavior	14
	226

**One duplicate.*
+Two duplicates.
Accounting for duplicates, discrete objectives total 222.

Table 8
Number of Objectives by Category

Improved health status	58*
Reduced risk factors	47+
Increased public/professional awareness	38*
Improved services/protection	51
Improved surveillance/evaluation systems	32
	226

**One duplicate.*
+Two duplicates.

offer, in and of themselves, the core principles necessary for management decisions. Rather, the directions for these decisions are found more substantially in the three objective categories that relate to improved public/ professional awareness, improved services/ protection, and improved surveillance/evaluation.

Table 9 reproduces the full list of objectives for high blood pressure control as an example of the kinds of objectives developed for each of the major categories. In this example, one objective is stated for improved health status, and two objectives for each of the other four categories. The improved health status objective—better control among an expanded portion of the hypertensive population—is straightforward. The objectives related to reduced risk factor include reducing the average daily sodium intake, salt being a prominent risk factor for hypertension in certain population groups, and reducing the prevalence of obesity, since this is also a prominent risk factor. The awareness objectives focus on two dimensions of the issue: awareness by individuals that hypertension is a prominent component of a broader range of risk factors for heart disease and awareness by individuals of their actual blood pressure levels. Both provide important program guidance since they can serve as rallying points for a variety of activities. For other conditions, for example, sexually transmitted diseases, health professionals as well as the general public are the target of awareness objectives.

The two objectives listed for improved services and protection also relate to important approaches to controlling high blood pressure. The first is the provision of an effective service delivery system accessible to all sections of the U.S. population, and the second relates to the provision of a mechanism to facilitate individual decisions with respect to dietary factors which might influence high blood pressure, that is, caloric or sodium intake. No statement is made as to the extent to which regulations may be involved in obtaining this objective, thereby leaving the issue of voluntary versus mandatory labelling policies open to agency judgment. The objectives related to improved surveillance and evaluation are to refine our understanding of high blood pressure's incidence and sequelae, including development of a taxonomy that facilitates categorization.

Establishment of the objectives was based on certain assumptions about the anticipated scope of program activity, the level of financial support, the range of participants involved, the state of the science base, and so forth. It was presumed that if major disjunctures occurred with respect to one or more of the assumptions, certain of the objectives would require amendment. Table 10 presents the principal assumptions underlying the high blood pressure control objectives.

Table 9
High Blood Pressure Control Objectives

Improved health status

(a) By 1990, at least 60 percent of the estimated population having definite high blood pressure (160/95) should have attained successful long-term blood pressure control, i.e., blood pressure at or below 140/90 for two or more years.

Reduced risk factors

*(b) By 1990, the average daily sodium ingestion (as measured by excretion) for adults should be reduced at least to the 3-6 g range.

*(c) By 1990, the prevalence of significant overweight (120 percent of "desired" weight) among the U.S. adult population should be decreased to 10 percent of men and 17 percent of women, without nutritional impairment.

Increased public/professional awareness

(d) By 1990, at least 50 percent of adults should be able to state the principal risk factors for coronary heart disease and stroke, i.e., high blood pressure, cigarette smoking, elevated blood cholesterol levels, diabetes.

(e) By 1990, at least 90 percent of adults should be able to state whether their current blood pressure is normal (below 140/90) or elevated, based on a reading taken at the most recent visit to a medical or dental professional or other trained reader.

Improved services/protection

(f) By 1990, no geopolitical area of the United States should be without an effective public program to identify persons with high blood pressure and to follow up on their treatment.

(g) By 1985, at least 50 percent of processed food sold in grocery stores should be labelled to inform the consumer of sodium and caloric content, employing understandable, standardized, quantitative terms.

Improved surveillance/evaluation systems

(h) By 1985, a system should be developed to determine the incidence of high blood pressure, coronary heart disease, congestive heart failure and hemorrhagic and occlusive strokes. After demonstrated feasibility, by 1990 ongoing sets of these data should be developed.

(i) By 1985, a methodology should be developed to assess categories of high blood pressure control, and a national baseline study of this

Table 9
High Blood Pressure Control Objectives *(continued)*

status should be completed. Five categories are suggested: (1) unaware; (2) aware, not under care; (3) aware, under care, not controlled; (4) aware, under care, controlled; and (5) aware, monitored without therapy.

*Same objectives as for nutrition.

Table 10
Principal Assumptions for High Blood Pressure Objectives

- The etiology of high blood pressure is multifactorial and no research breakthrough will eliminate it as a public health problem in the next decade.
- The basic components of successful control programs will continue to be detection, evaluation, treatment and/or changes in life-style, and follow-up.
- While there are still some uncertainties about the quantitative relationship between sodium ingestion and high blood pressure, it is important to begin moving in the direction suggested by the data.
- While there is not yet a true consensus as to what constitutes dangerous levels of overweight for the population as a whole, the stated targets provide the pattern for a productive trend.
- Governmental efforts to control high blood pressure will be continued and expanded.
- Voluntary and private sector efforts to control high blood pressure will be continued and expanded.
- Health System Agencies will give high priority to high blood pressure detection, treatment, and control.
- Implementation of the smoking, nutrition, and physical activity recommendations (see appropriate sections) will have a favorable impact on the prevention and control of high blood pressure.

Implementation

Once the objectives were published in 1980, the government's task was twofold: to tailor its own agenda to achieving the objectives and to stimulate activity in the non-federal sector as well. Several steps were initiated to develop the federal agenda. Each of 15 areas was assigned to one or another of the Public Health Service agencies with responsible program activity in the area (Table 11), and that agency was directed to lead in planning the federal contribution to obtaining the objectives. The designated lead agency then assumed the obligation to develop an implementation plan that reflected not only its potential contribution, but that of its sister agencies as well, in achieving the set of objectives for a particular area. In doing so, the lead agencies were asked to convene working panels involving the other agencies to identify those objectives which were the highest priority from the federal perspective, to develop implementation plans which reflected the available and potential program activity to meet these objectives, and to identify the non-DHHS governmental and private sector participants whose co-operation in the process might be required. Once these implementation plans were developed they were again circulated within the government to various interested parties and revised accordingly. They were published in 1983 in a special supplement of *Public Health Reports* (DHHS, 1983b).

A system of monthly progress reviews was established. Each month a session has been scheduled to assess the progress toward the objectives in one or another of the 15 areas. Consequently, in the course of a little over a year each of the priority areas will have had one progress review to identify relevant activities, accomplishments, and needs. At these progress review sessions, the lead agencies gather together with other co-operative agencies and present to the Secretary their program of activities. At that time the potential shortfalls are noted, problems are raised and suggestions made for revision of either the objectives or the implementation plans, based on progress and experience to date. Summaries of the progress reviews are published in Public Health Reports to provide broader dissemination of the activities.

In addition to the federal activities to implement progress in each of the objective categories—including individual agency work to involve the private and voluntary sectors—a broad effort directed at catalyzing state and local efforts to tailor the objectives to their needs is overseen by the U.S. Public Health Service's Centers for Disease Control in Atlanta, Georgia. Here the intent is to encourage states and localities to take the model provided by the nationwide objectives and apply it to local conditions,

based on their own assessment. A volume to assist in this effort has been prepared and published through the Centers for Disease Control, *Model Standards for Community Preventive Health Services*. This manual was a cooperative effort of the federal government, the American Public Health Association, and the Association of State and Territorial Health Officers. Several states have already attempted to tailor the process to their own needs and it is anticipated that involvement of this sort will be broadened in the future.

Table 11
Lead U.S. Agencies for Objectives

Category	DHHS agency/Office
Prevention services	
High blood pressure control	National Institutes of Health
Family planning	Health Resources and Services Administration
Pregnancy and infant health	Health Resources and Services Administration
Immunizations	Centers for Disease Control
Sexually transmitted diseases	Centers for Disease Control
Health protection	
Toxic agent control	Senior Advisor for Environmental Health
Occupational safety and health	Centers for Disease Control
Accident prevention and injury control	Centers for Disease Control
Fluoridation and dental health	Centers for Disease Control
Surveillance and control of infectious diseases	Centers for Disease Control
Health promotion	
Smoking and health	Office on Smoking and Health
Misuse of alcohol and drugs	Alcohol, Drug Abuse, and Mental Health Administration
Nutrition	Food and Drug Administration
Physical fitness and exercise	President's Council on Physical Fitness and Sports
Control of stress and violent behavior	Alcohol, Drug Abuse, and Mental Health Administration

Monitoring

The task of monitoring progress on a national basis is among the most challenging faced in the process. When the objectives were first published the data sources then available were listed for each of the 15 areas. Unfortunately, the data necessary to track progress must come from a variety of different data sources and baseline data are not always available for the objectives that have been established. For example, of the 190 objectives outside the surveillance and evaluation category, only 112 have extant data sources. The greatest share of those which are currently measurable are in the health status category—about 89 percent of which are measurable—while only about 10 percent of the objectives related to public and professional awareness are measurable with current sources.

There is a wide range of possible systems which can be drawn upon to provide these data. They include (a) data systems based on records, such as those in the U.S. Vital Statistics System; (b) population-based surveys, such as those periodically undertaken by various health agencies to determine the prevalence of various health habits; (c) surveillance and monitoring systems, such as those established to monitor infectious disease prevalence; and (d) regulatory reporting systems established to monitor compliance with statutes or regulations (Green et al., in press). The agency which generates the data sets with broadest applicability to the objectives is the U.S. Public Health Service's National Center for Health Statistics, which sponsors surveys such as the National Health Interview Survey, the National Health and Nutrition Examination Survey, the National Ambulatory Medical Care Survey, the National Hospital Discharge Survey, the National Natality and Fetal Mortality Surveys, the National Survey of Family Growth, and the National Vital Registration System.

In spite of the considerable resources made available by these surveys, the various agencies overseeing implementation of the objectives must draw upon more than 40 agencies as data sources, and more data are still needed to track progress adequately. The problems for monitoring are obvious. Many of the surveys employed are one-time-only surveys, hence will not provide data on a longitudinal basis. Furthermore, the fact that so many different sources are involved in generating the data used for monitoring raises problems of comparability of sampling techniques, thereby limiting the generalizability of the findings.

To address the monitoring problem, a formal data working group has been established which is carefully reviewing the requirements to make recom-

mendations for federal action in this respect, including consideration of the parameters for a broad information management system. A sound monitoring system is an essential for future effectiveness of the effort to manage national progress through objectives.

Case Examples

Use of the management by objectives process, explicitly or implicitly, to direct health progress is certainly not without precedent nationally or internationally. Several examples of its application to health-related issues are presented below. They indicate the extent to which a systematic approach of this sort can be successful in facilitating attainment of certain goals. Many of the examples—smallpox eradication, childhood immunization, and lead poisoning control—illustrate the use of quantified objectives. High blood pressure control and smoking cessation are included as examples in which objectives are not quantified.

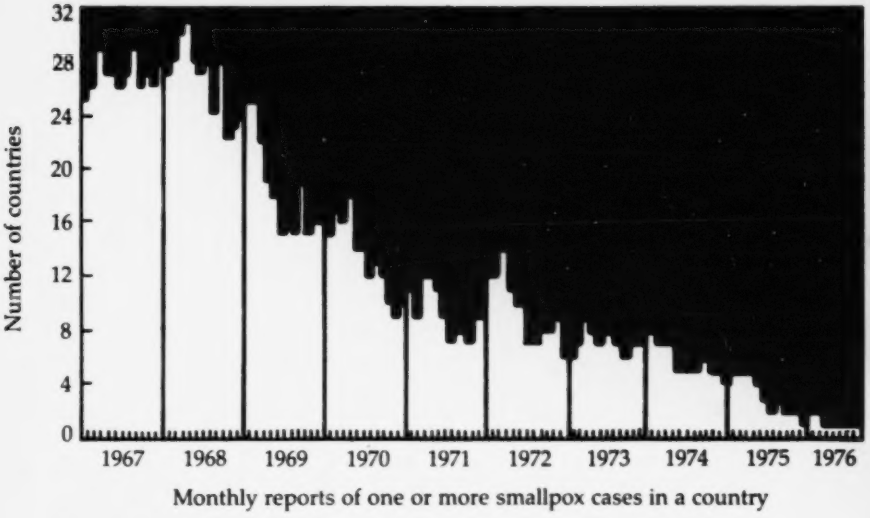
Smallpox Eradication

The WHO's global smallpox eradication program, which formally began in 1967 and achieved eradication of the disease in 1977 (Figure 3), offers one of the most spectacular examples of successful targeting in health. Its latter phases are particularly instructive with respect to the utility of quantified objectives for program management.

Efforts to eliminate smallpox as a global scourge slowly increased and expanded following Edward Jenner's discovery in 1796 that cowpox infection would confer protection against the smallpox virus. Formal vaccination programs followed shortly with Austria leading the way in 1799, and the Grand Duchy of Hesse developing the first legislation making vaccination compulsory in 1807. Thereafter, vaccination legislation was passed by various countries around the world. By the 1920s, the problem had become an international issue. In 1926 the health section of the League of Nations initiated publication of a weekly bulletin on disease prevalence in various countries and smallpox was made a reportable disease. The Pan American Sanitary Bureau—now the WHO Regional Office for the Americas—began an active involvement in smallpox control in the 1940s and 50s, and by 1959 smallpox had been effectively eliminated in the Americas with the exception of outbreaks in Argentina, Brazil, Bolivia, Columbia, and Equador.

In 1966, noting the success of certain control programs of various countries around the world, the World Health Assembly authorized a program to

Figure 3. Smallpox Reports



Source: Henderson (1976).

eradicate the disease, to commence 1 January 1967. At the time smallpox was endemic in 33 countries with major reservoirs in three general areas: South Asia, SubSaharan Africa, and Indonesia (WHO, 1972).

The overall goal of the WHO was to eliminate the disease globally by the end of 1976. To accomplish this, several specific objectives were established from the outset: standardization of vaccines; simplification of vaccination techniques; improvement of the reporting systems; and initiation of national mass vaccination programs. Other objectives were added after the program had been in operation for a period: the focal concentration of program efforts around outbreaks; the initiation of active surveillance techniques; and expansion of public awareness of and involvement with the program.

One of the first tasks undertaken was the standardization of vaccines through the establishment of two reference centers which could work on vaccine improvement. By 1970, all of the vaccine used in the program met the accepted international standards (Henderson, 1976). In addition, an etficient mechanism was needed for delivering the vaccine doses. The scratch technique, which had been used for some years, proved both inefficient and wasteful. For a period mechanical injection via a jet injector,

which had been developed by the U.S. Army, was deployed but complications arose due to the breakdown of these injectors and the difficulty of repairing them. Finally, a major technological breakthrough by Wyeth Laboratories—the bifurcated needle—made it possible to deliver a drop of vaccine efficiently via a puncture technique.

To improve reporting, efforts were made to strengthen the capability of various national governments to retrieve accurate and regular reports from the field through special surveillance teams. This need was prompted by an early recognition that the disease was vastly under-reported and unreliably reported, thereby making the targeting of control efforts more difficult.

The control measures were initially designed as two-to-three year efforts toward mass vaccination of a national populous. It was felt that if 80 percent of the population could be vaccinated, smallpox incidence would be substantially reduced (Henderson, 1976). As the campaign proceeded, and indeed relatively early in its course, several strategic enhancements were implemented. First, as a result of work in Nigeria to focus scarce vaccine resources around identified outbreaks, it was discovered that the initiation of focal containment efforts could be highly successful in eliminating broader scale transmission of the disease. Consequently, the strategy of mass vaccination was shifted to one of surveillance and containment, which included improved search and detection, isolation of the affected cases, and vaccination of suspected or potential contacts around the identified cases. During the course of the various efforts, as the resources could be concentrated even further with the declining incidence of the disease, containment included posted watch guards outside the houses of contaminated visitors to insure vaccination of all contacts and intensive vaccination efforts of all exposed populations in a one mile radius around a case.

Similarly, surveillance became much more active. Rather than relying on a passive reporting system sent in from districts, states and regions, in 1973 in India a system of weekly active searches was established. Smallpox workers around the country were pulled together and mobilized for a week-long village-to-village and house-to-house search for cases. Again, as resources became more readily available with the declining disease incidence, greater emphasis was placed on any village with a reported case and individuals were posted in these villages for periods of up to six weeks after the last case had occurred to insure that no new cases were in fact occurring.

As part of active surveillance, an intensive effort was undertaken to expand the level of public involvement through efforts to inform the public about

the nature and importance of the disease. A reward was offered for reporting of the disease and, in the Indian program, the availability of the reward was posted prominently in each village with vulnerability to a smallpox outbreak. The reward eventually grew to a sizeable amount, as the disease declined in incidence and the importance of these reports by the public became more prominent.

In the very last stage of the program—as for example in the last year of the program in India—the explicit use of management by objectives became a prominent program feature. Target levels were set both for disease incidence and for surveillance efforts, by state, region, and district. Active searches of large regions were held on a monthly basis and detailed reports made to central state and national officials. Regular statewide and national reviews were held on the progress in meeting the stated objectives. Detailed discussions were held on reasons for success or failure, and program activity or the objectives were revised accordingly.

By October of 1977 the last field case of smallpox occurred in Merka, Somalia, and in May of 1979 the World Health Assembly officially declared smallpox eradicated.

Childhood Immunization

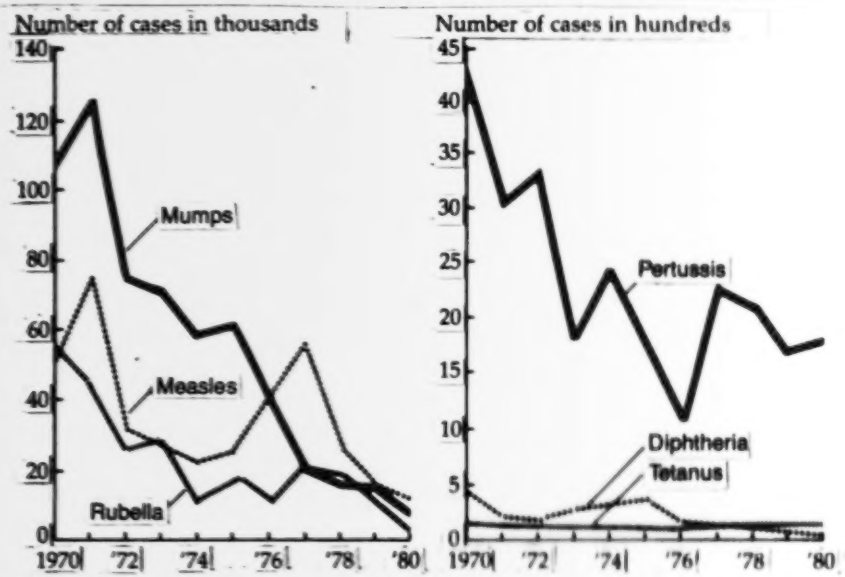
Childhood immunization is another infectious disease control effort illustrative of the successful application of the management by objectives process. In 1977 in the United States a major national immunization initiative was launched to immunize children under the age of 15 years for the seven most common preventable childhood diseases: polio, measles, rubella, pertussis, tetanus, diphtheria, and mumps. At that point nearly 20 million of the 52 million children in the country were not adequately immunized against these diseases and the incidence of several was beginning to increase (Figure 4). For example, the incidence of measles had increased consistently since 1974 with the number of cases in 1977 running some 50 percent higher than the preceding year. More importantly, the disease was being reported more frequently in older age groups—among junior high school, senior high school, and even college students—and these cases were accompanied by the increased risk and severity of complications which frequently characterize the occurrence of childhood diseases in young adults.

The national immunization initiative was begun in May 1977 with two basic goals: first, by October of 1979 to raise immunization levels above 90 percent for all children under age 15 years; and second, to establish a permanent

mechanism to provide comprehensive immunization services to virtually all of the newborns in the United States every year.

To meet these goals several specific objectives were established: improving awareness of the general public about the importance of childhood immunization; encouraging the interest and involvement of both public and private health care providers in immunization services delivery; creation of a broad network of volunteer programs as participants in the effort to identify children in need of immunization and deliver services to those children; involvement of business, industry and organized labor as full partners in the immunization effort; establishment of a special focus on individuals and organizations with access to urban inner-city areas and pockets of rural poverty; and full participation by state health and education authorities in the effort with special emphasis on enactment and enforcement of school entry laws requiring immunization for all school children.

Figure 4. Reported Cases of Measles, Mumps, Rubella, Diphtheria, Pertussis, and Tetanus: 1970-1980



Source: Centers for Disease Control.

To implement the stated objectives, a special unit was established by the Secretary of Health and Human Services (then Health, Education, and Welfare) under the leadership of the U.S. Public Health Service's Centers for Disease Control and directives were issued by the Secretary to all relevant departmental units to offer full co-operation with the effort. Special immunization liaisons were identified in the service delivery programs which had special access to children, such as the federally operated community health centers around the country, the Head Start/Day Care facilities operated through the national Office of Human Development Services, the education units involved in the establishment of school policies and especially school health policies, and the health care financing efforts which paid for services offered to low-income children. Liaisons were also established with other federal agencies important to implementing the effort such as the Department of Defense which had a large dependent population (not to mention the recruit population) in need of immunization services, the Community Services Administration with community programs oriented towards youth, the Department of Agriculture which operated a large network of agricultural extension agents at the local level who could be employed in raising the awareness of the needs for immunization activities. Liaisons were also established with the voluntary organizations such as the Parent Teachers Association, the National League for Nursing, and a host of other voluntary organizations with resources to be used at the local level.

For those agencies within the Department of Health and Human Services which had direct access and responsibility for a client population (that is, the community health centers, the Indian Health Service, the Head Start program, the Medicaid program) specific targets were set for immunization doses delivered, share of the population immunized, and implementation of surveillance activities. Both quarterly and annual targets were established, and quarterly review sessions were held, chaired by the Secretary, to review progress of each of the agencies in meeting their targets. Where shortfalls were noted, full explanations were required; where new opportunities existed, strategies were developed to take advantage of those opportunities.

By the fall of 1979, the goal was largely attained for children entering school, with immunization rates of 94 percent for measles, 93 percent for rubella, 93 percent for DPT (diphtheria, pertussis, and tetanus), 93 percent for poliomyelitis, and 86 percent for mumps. More importantly, in 1980 the number of cases of measles, mumps, rubella, tetanus, and diphtheria was at an all-time low (Figure 4). Indeed, the nation has now achieved a level of control sufficient to warrant the expectation that measles can be eliminated as an

indigenous problem in the United States within a short time. This success is attributable to a program that sought to achieve a specified set of objectives in a very structured way.

Control of Environmental Lead Levels

Whereas the previous two examples recount efforts which were for the most part administratively derived, the efforts which have been undertaken in the United States to control the toxic effects of lead exposure have an additional dimension—prominent involvement of the legislature. Nonetheless, the experience is also instructive for its success in establishing quantified targets as a means of focusing national energies toward specific endpoints.

Lead has no known useful function in the body and exerts adverse effects in both adults and children. Young children are much more susceptible to the effects of lead exposure than adults because of the increased vulnerability of the developing brain and increased intestinal absorption of lead. Lead primarily affects three systems in man: the nervous system, the kidney, and red blood cell synthesis (Leah, 1976). Lead is a metallic element that occurs naturally in extremely small concentrations but is highly toxic in a slow-acting manner. Lead poisoning can result from exposure to either inorganic or organic lead compounds taken into the body by ingestion, inhalation, or absorption through the skin. Some of the major sources include exposure to organic forms of lead such as tetraethyl and tetramethyl lead which are used in "antiknock" ingredients in petrol, and inorganic lead compounds used as pigments in corrosion-resistant paints.

Though instances of lead poisoning have been recorded for centuries, even millenia, with the advent of the industrial age, lead and its compounds have found many applications in industrial processes. Along with those applications, incidences have increased in which people have had harmful health effects as a result of exposure to lead poisoning. As a result of expanded awareness of these illnesses, concern about the problem has grown. Consequently, the federal government has taken a number of actions during the past several years to limit the exposure of Americans to lead residues. These actions have included limits on the allowable lead content in low-dose sources such as water, ambient air, and processed food in addition to the high-dose exposure sources of paint and petrol.

Several statutes are relevant. Each has the goal of reducing exposure of the U.S. population to lead and lead compounds, and requires the responsible

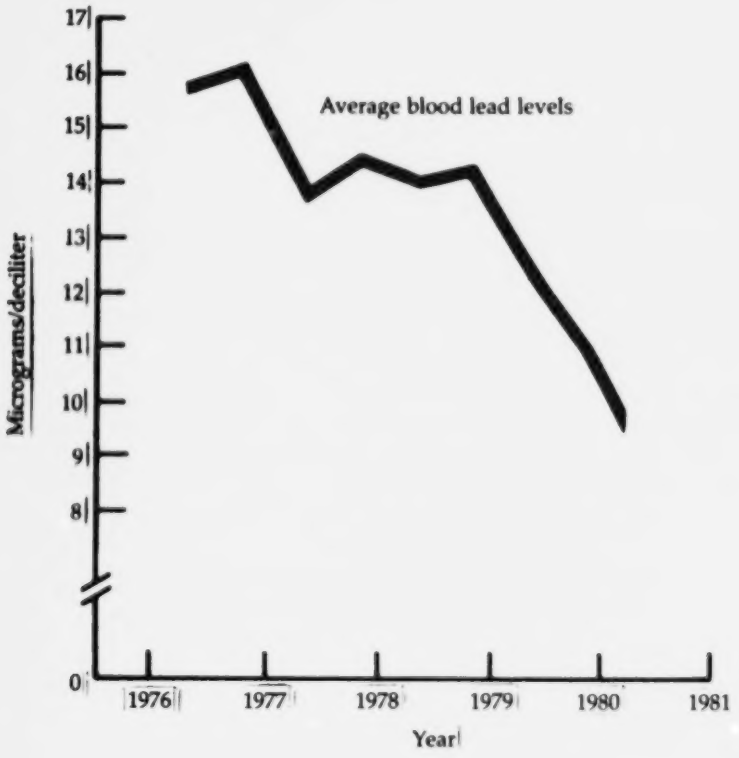
agencies to establish quantifiable objectives to that end. In 1971, the lead-based paint Poisoning Prevention Act (P.L. 91-695) and subsequent amendments in 1973 and 1976 gave the U.S. Department of Housing and Urban Development a broad mandate to conduct research and demonstrations related to lead paint hazards. Specifically, the Secretary of the Department was instructed to develop and carry out research to determine the nature and extent of the problem of lead-based poisoning in the U.S., particularly in urban areas, and the method by which lead-based paint can most effectively be removed from interior and exterior surfaces. The original and subsequent amendments further instructed the Department of Health, Education, and Welfare to fund local programs for lead-paint poisoning control, which have been carried out through the U.S. Public Health Service's Centers for Disease Control.

In 1971, the Food and Drug Administration issued a standard that lead-based paints could contain no more than 0.5 percent of lead by weight. In 1973, the newly created Consumer Product Safety Commission was instructed in P.L. 93-151 to conduct appropriate research in lead-based paint in order to ascertain the safe level of lead in residential paint products. Although the study caused the Commission to uphold the standard of 0.5 percent of lead by weight as a safe level, the results were disputed by Congress which considered the imposition of legislation requiring much more stringent standards. Ultimately, regulations were adopted by the Consumer Product Safety Commission which lowered the lead standard for paint to 0.06 percent by weight.

In the Clean Air Act of 1970, as amended, Congress also initiated vigorous action with respect to ambient air standards for lead emissions. It required the Environmental Protection Agency (EPA) to set standards for any pollutant that might endanger the public's health and welfare. As a result EPA has promulgated regulations specifying a schedule for reducing the lead content of petrol. Two sets of regulations were issued, one requiring the sale of "unleaded" petrol (less than 0.05g/gal) and another reducing the content of leaded grades of petrol. The schedule initially established by the EPA was subsequently altered as a result of a combination of factors including court decisions, administration deregulatory emphases, and the prospect of petrol shortages. Even though the schedule for phasing down the level of lead content was delayed, the overall lead content has dropped substantially and accordingly the public's exposure has diminished. During the 1976 to 1980 period the amount of lead used in gasoline production fell from 53,000 to 24,000 tons per quarter year (DHHS, 1983a).

Meanwhile, the results on exposure to the general public of all these factors has been substantial. Figure 5 shows the drop which has occurred in the average blood lead levels in the U.S. population ages 6 months to 74 years. The results of the U.S. National Health and Nutrition Examination Survey (NHANES) between 1976 and 1980 indicate that there has been a decrease over these years of the mean blood lead level from 15.8 micrograms per decilitre to 10.0 micrograms per decilitre. This represents a 37 percent reduction in these blood levels (DHHS, 1982). One estimate suggests that

Figure 5. Mean Blood Levels of Population 6 Months - 74 Years: United States, February 1976-February 1980



Source: DHHS (1982).

during the period of 1976 to 1980 an estimated 46 percent of the blood lead of the average American was due to petrol lead emissions, indicating the importance of controlling emission in the past and prospective gains (ICF Incorporated, 1982).

In addition, since the inception of a childhood lead-based paint poisoning prevention program in 1973, nearly four million children have been screened and 6.1 percent were found with lead toxicity. For 1981-82, approximately 500,000 children were screened and only 4.1 percent had lead toxicity, the lowest figure ever (CDC, 1982).

In spite of the substantial gains which have been achieved there are still formidable problems for certain population groups. Specifically, black children have higher blood lead levels than older blacks or whites as a result of exposure to the same levels of petrol lead emissions. The NHANES II showed that 18.6 percent of black children living in inner-cities or urban areas of one million or more population had unacceptably high blood lead levels. Comparable figures for other groups include: white inner-city children, 4.5 percent; children from smaller urban areas (that is, less than one million population), 3.5 percent; and children from rural areas, 2.1 percent (NCHS, 1981). The challenges for more rigorous implementation of these objectives are apparent.

Non-Quantified Targeting

The fact that these three examples manifest impressive success in the use of quantified targets to achieve health gains does not imply that targeting which does not include the a priori establishment of measurable objectives—non-quantified targeting—is unimportant. Indeed, quite the contrary is true. Many more broadly and less specifically quantified efforts have been successful in the past. The national reduction in infant mortality has already been noted. High blood pressure control and smoking cessation are also good illustrations of the success of programs with a broad focus.

In 1972, the National High Blood Pressure Education Program (NHBPEP), coordinated by the National Heart, Lung, and Blood Institute (NHLBI) at the National Institutes of Health, was begun as a government and private sector partnership to reduce cardiovascular deaths by detecting and controlling high blood pressure. The NHBPEP is a coalition of about 15 federal agencies, 150 major national organizations, 50 state health departments, 2,000 organized community control programs, and a variety of other facilitating groups. The federal role in the process is that of a catalyst—helping in the design of intervention methods, identifying target groups, and stimulat-

ing the activities of a number of resourceful participants around the country. As Table 12 shows, the results of the NHBPEP have been dramatic. Between 1971-72 and 1974-75, the share of people with diastolic blood pressure greater than or equal to 105 mm Hg, but whose hypertension was never diagnosed, declined 30 percent for the population as a whole. The decline was greater for blacks (43.8 percent) than for whites (17.2 percent).

Surveys also indicate that public knowledge about high blood pressure has substantially improved over the last eight years, that first visits to physicians for hypertensive disease (not including referrals) increased by 45 percent between 1971 and 1976, and as noted earlier, that stroke deaths have declined markedly (NHLBI, 1978).

National efforts aimed at reducing cigarette smoking have also had notable successes. Reports about the health hazards of cigarette smoking began making their way into the public press in the early 1950s. In response to these reports, there were occasional transient downturns in smoking behavior. But it was in 1964, with the publication of *Smoking and Health*, the report of the Advisory Committee to the Surgeon General, and the initiation of a vigorous anti-smoking program, that the increase in per capita cigarette consumption began to be checked over a sustained period (DHEW, 1964). A recent regression analysis of cigarette demand has suggested that in the absence of an anti-smoking campaign, consumption of cigarettes in 1980 would have been about 41.5 percent greater than that which actually occurred (Figure 6). Per capita consumption of cigarettes has fallen approximately 1 percent per year since 1973 (Warner, 1981). The proportion of all males who smoked in 1979 was about 37 percent versus 53 percent in 1964; in females, the proportion was about 28 percent compared with 42 percent in 1964 (DHHS, 1980b). Even for teenagers, among whom the problem has been the greatest recently, current trends are encouraging. Though there

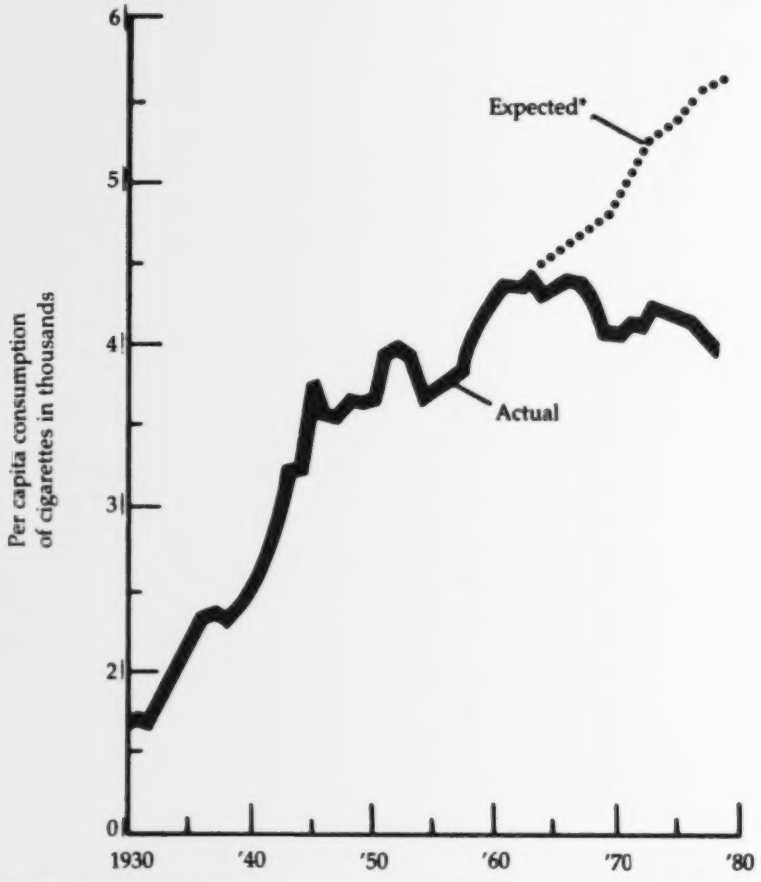
Table 12
High Blood Pressure Control

	Percent with diastolic blood pressure 105 mm Hg or more but never diagnosed		
Group	1971-72	1974-75	Percent change
Total Population	45.6	31.9	-30.0
Whites	48.8	35.0	-17.2
Blacks	40.4	22.7	-43.8

Source: National Health and Nutrition Examination Survey I, 1971-1975, National Center for Health Statistics.

was an increase in smoking by teenagers from about 12 percent in 1968 to 16 percent in 1974, the proportion of persons between the ages of 12 and 18 years who smoked regularly had dropped again by 1979 to below 12 percent (Green, 1979).

Figure 6. Trends in Cigarette Consumption



*Consumption predicted in the absence of antismoking campaign and with assumed price constancy.

Source: Adapted from Warner, 1981 (p. 730); copyrighted 1981 by the American Association for the Advancement of Science.

With the stimulus provided by the 1964 report, a broad range of contributors have pooled their scientific, legal, and marketing talent to establish programs successfully targeted to specific populations. The impressive results obtained reflect an effective partnership between public programs and private efforts such as those of the American Cancer Society, American Lung Association, and American Heart Association.

Yet even these general national efforts to reduce smoking and high blood pressure encompass important elements of targeting and monitoring. Each has fostered directed efforts to identify and reach vulnerable population groups, to enroll a wide variety of service agencies, and to stimulate the monitoring of programs not only at the national, but also at the local level. The local focus of activities has in fact been a prominent feature of the work.

Caveats and Conclusions

The prospects for wider application of these models to a broad set of health problems—that is, the prospects for achieving the targets set forth in *Promoting Health/Preventing Disease: Objectives for the Nation*—are as disparate as the objectives themselves. In spite of the merit and utility of the management by objectives approach, there are certainly constraints.

The targets with the best prospects are probably those that depend more on technical interventions and less on behavioral change, those that offer the potential for greater economic returns or at least fewer economic losses to industry or society, and those that appear to be most socially neutral. Accordingly, a few important caveats must be considered.

First, the amount of support that can be drawn from the science base for use in the formulation of objectives varies considerably in the five categories. For example, among the health status objectives, a specific objective for reduction of caries can feasibly be established based on the anticipated provision of fluoridated water supplies, because the protective nature of fluoride against dental caries is well defined. On the other hand, understanding of the relationship between a number of toxic agents and various disease outcomes is still emerging, so that qualitative—not to mention quantitative—estimation of the potential for improved health status is difficult. Among the objectives related to reducing risk factors, setting up a target on exposure to the risks of smoking is much easier than setting up one on exposure to atmospheric sulphates, or even one on the adoption of certain exercise levels (levels that people frequently misreport). Action based on the information available is nonetheless required.

Second, even when quantified objectives are established, state and local interest in, and the capacity for, such evaluative efforts vary substantially. Yet, since the purpose of setting objectives is to encourage program evaluation and adaptation of the objectives at the local level, progress depends on that interest and those efforts. This link between federal and state and local efforts is particularly needed as the distribution of federal funds emphasizes the mechanism of block grants, which provide for greater state and local discretion in setting priorities and allocating resources.

Third, progress depends upon the continued development of data systems. Yet at this time data collection is especially vulnerable because of financial constraints. Although data-gathering capabilities in the United States surpass those of many other countries, some prominent geographical and substantive deficiencies still exist in these data sets. Possibly, the most limiting is the paucity of data available at the state and local levels. Beyond these geographical constraints are the limits in information relative to certain categories of objectives, especially those related to improving public and professional awareness of the various prevention areas. An apparent lack of interest in assessing such awareness suggests that people are assumed to be passive participants in the protection of their own health—an attitude that presents a compelling program challenge. The gains that will be most difficult to achieve will be in health promotion and behavior enhancement; facilitation of the gains made in those areas will depend upon adequate data to track progress.

Fourth, though much of the progress of the future will depend upon how effectively people can be motivated, understanding of both the potential and the constraints of the behavioral and communications sciences remains limited. Although considerable numbers of people apparently have been improving their life-styles as better information has become available about the links of life-styles to ill health, there is still scant evidence to offer tested ways of accelerating societal response to this information.

Fifth, if this goal-oriented approach is to succeed, a social will must exist to support its various components. Though uniform agreement is not required on the priorities to be assigned to activities, some commitment is needed to the process of establishing targets, measuring progress, and realigning activities. This commitment requires not only consensus, but a considerable amount of will at a variety of levels.

Caveats notwithstanding, the establishment of measurable health objectives holds promise for enhancing health gains. One of the more significant features of this process is the extent to which the effort reflects progress in

the development of consensus about our health goals and about some of the means for attaining them. The broad and elaborate review that was undertaken in the course of drafting and revising the health objectives for the U.S. nation has ensured a thorough discussion of the issues. Consensus, however, does not denote unanimity. Diversity and compromise are prominent components of consensus development, and the product that emerges is inevitably more conservative than many participants would have urged. But the degree of consensus about appropriate directions for prevention is considerable, given the scope of the objectives and the number of participants in the process.

Setting objectives is in effect only a starting point. This process reveals the need also for a commitment, which must be met by realigning activities and resources—tasks that can be onerous, particularly for those at the state and local level. Although difficult, a deliberate review of priorities and the targeting of activities can improve the allocation of resources—chores that are even more critical during times of fiscal constraint. If targeting progress in health helps set the sights more specifically, a nation should be better able to register its successes and detect its failures—and perhaps even, in time, correct its course. The potential for gain seems well worth the effort.

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